

This desensitization particularly characterizes cases of tuberculosis which are preponderantly proliferative in type, the so-called fibroid cases. Cases are sometimes preponderantly proliferative from the very start, as mentioned by the author, and may remain so until healed; or until, for some reason, either an excess in dosage of bacilli or a depression of immunity, allergic phenomena again come to the fore, and cause an exudative reaction to be superimposed upon the proliferative process. The preponderantly proliferative lesion is relatively mild.

Since patients suffering from chronic proliferative tuberculosis do not show the same degree of toxemia as those with exudative lesions of similar extent, they can be treated differently. They can be put on exercise sooner and be treated by a less restricted regimen. There is one thing, however, that must always be borne in mind in considering treatment for the chronic proliferative type, and that is, that the toxemia is so slight that the patient too often finds himself with an extensive lesion before he knows it is present. He is usually apprised of its presence by a breakdown of his immunity, associated with an increase in allergic reaction, which is shown by an increased acuteness, or by dyspnea, which is produced by the gradual restriction in the amount of functioning pulmonary tissue, or by symptoms on the part of the gastro-intestinal tract. So for this reason the proliferative type of tuberculosis should be treated seriously as soon as recognized so that the patient be given full chance for recovery.

There is a tendency on the part of some clinicians to assume that small proliferative lesions are benign and require no special attention. When one recalls that all extensive proliferative processes were once limited in extent, the necessity of treating any lesion which is unhealed as a potential danger must be evident. It may be treated differently, but it must be followed carefully and the patient must be kept under rigid surveillance until healed. Doctor Shipman rightly makes the difference in character of lesion the basis for a variation in therapy, but he does not make the preponderantly proliferative process a basis for a let alone policy, as some are inclined to do.

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C. E. ATKINSON, M.D. (Southern Sierras Sanatorium, Banning).—The title of Doctor Shipman's article, "The Clinical Classification of Pulmonary Tuberculosis," appeals to me as having been exceptionally well chosen. Although exudation and proliferation are, as Doctor Pottenger states, essentially merely different phases of the same process, varying only quantitatively, yet for clinical purposes and as a working guide to prognosis and treatment, a classification along the lines suggested is most helpful.

I think it is understood that the classification should go further, including, so far as feasible, notations such as the extent and location of the lesions, and recording the presence or absence of cavities.

My own views coincide with the discussions by Doctor Bush and Doctor Pottenger. As pointed out by Doctor Shipman, exudative lesions at times clear rapidly; and in some instances no evidence, or practically no evidence of the tuberculosis, remains. We may well bear this fact in mind when reexamining a patient who has previously been informed by another physician that he has tuberculosis. If a reputable physician has previously made a diagnosis of tuberculosis, even though our findings at a later date are practically negative, we are not justified in telling the patient that he did not have tuberculosis. Most persons have the impression that tuberculosis always leaves scars or some reminder of its prior presence; so, if our examination discloses no evidence of tuberculosis, it seems a good plan to explain to the patient that exudative tuberculosis may disappear completely, with no trace remaining.

In cases of the proliferative type with cavitation, it is not uncommon for an acute bronchogenic extension of an exudative nature to occur in the oppo-

site lung. In a number of such patients, I have regretted not having adopted pneumothorax treatment sooner. Even in the presence of an exudative extension in the contralateral lung, if it is not too widespread, collapse therapy may still prove effectual.

Exudative tuberculosis is often brought to attention by a flu-like attack, or a so-called cold, and sometimes resembles a bronchopneumonia. It may develop rapidly into a veritable galloping consumption, and many cases will be altogether missed unless x-ray studies are made routinely.

Now and then there may, at an early stage, be difficulty, particularly as regards roentgen evidence, in distinguishing exudative tuberculosis from a non-specific congestion or inflammation, or from a more or less localized pneumonic process, such as may be produced by influenza. A careful review of the evidence from all standpoints is, then, necessary before arriving at a diagnosis.

Exudative tuberculosis demands a prompt and intensive application of rest, and extraordinary watchfulness is imperative. If a satisfactory response is noted, no further measures are required. Owing to the comparative thinness of the cavity walls and to the relative absence of fibrosis, cases of predominantly exudative tuberculosis with excavation yield exceptionally well to collapse therapy. Cavities sometimes close completely under the more ordinary regimen, but frequent check-ups should be made, and if the case is not responding satisfactorily, some form of collapse therapy, in the absence of contraindications, should be instituted without further delay.

BLOOD TRANSFUSIONS IN CHILDREN*

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DISCUSSION by P. F. McMurdo, M.D., San Francisco;
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IT is very difficult at the present time to properly evaluate the status of blood transfusions in pediatrics. Reports by Sidbury and by Krahulik and Koch describe results in practically every disease of childhood. It is at once apparent that, despite the type of illness or the condition of the patient, transfusion is a fairly benign form of therapy free from the dangers formerly ascribed to it. Therapy, however, that is used simply because it will do no harm and may do some good, is obviously not scientific medicine and will quickly deteriorate to the level of many obsolete panaceas. The most careful statistical analyses are necessary before we can feel certain that mortality rates have been reduced. The purpose of this paper is to give a brief review of prevailing impressions concerning blood transfusions in children and to reemphasize some of the details of technique.

BLOOD DONORS

The amount of blood required for infants is comparatively small and, consequently, very little attention is paid to donors. Nevertheless, the blood of any individual who is repeatedly used as a donor should be investigated in order to avoid the production of an anemia. Although one person on record has been used sixty times and given 50,000 cubic centimeters of blood within six years (a total loss of ten times his blood

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volume) and remained well, others have developed a dangerous anemia after giving a much smaller amount. As an average, a healthy man may give 500 cubic centimeters of blood about eight times a year. It is also essential that the donor should have not only a negative Wassermann, but also a negative luetic history. There are recorded instances of syphilis developing in a normal patient after being transfused with blood from a latent syphilitic. Of more recent interest is the possibility of transmission of anaphylactic or reaction bodies when using a donor who is sensitive to any of the ordinary proteins. Ramirez has reported the contraction in a recipient of hypersensitivity to horse dander following a blood transfusion from an asthmatic donor. This is corroborated by the phenomenon known as "passive transfer" in which a positive skin test may be produced in a nonsensitive individual by performing the test over an area of skin that has previously been infiltrated with serum from a sensitive subject. Although this particular point is still not settled, it would seem wise to avoid, when possible, donors who are the victims of hay fever, asthma, and allied diseases.

The necessity for cross-agglutinating, as well as simply grouping, is more evident on the basis of Guthrie and Huck's reported three pairs of isohemagglutinin factors. They found that the original Group 2 is not a unit, but rather is composed of at least two types; the serum of each containing a single agglutinin, but the red cells differing in that one type contains two agglutinogens, the other only one. I have recently seen a similar case. The patient was a Group 4, but despite some twenty matchings, we were unable to find a donor. All the Group 4's failed to match. It is interesting that we finally transfused the patient intraperitoneally with a Group 4 donor without encountering any difficulty.

TRANSFUSIONS IN DIFFERENT DISEASES

Anemia.—Transfusions have always proved the most rapid and efficient way of treating the various anemias of childhood. The results from dietary and medicinal treatment are so slow that the infant remains a potential subject for any prevalent infection over a dangerous length of time. The prompt response to transfusion is well illustrated in the following case.

A male infant, first seen at one year of age, had a history of prematurity and a birth weight of three pounds. The patient was unable to sit up, ate poorly, was very pale, and weighed just fifteen pounds. The spleen was enlarged and the hemoglobin (Sahli) was 15 per cent. The tuberculin test was strongly positive. His mother died a few weeks later of pulmonary tuberculosis. After a blood transfusion of 165 cubic centimeters the hemoglobin was raised to 40 per cent, and three weeks later, after a second transfusion, the hemoglobin was raised to 60 per cent. He gained three pounds during the month and subsequently became perfectly well.

Sepsis.—Transfusions during the early stages of acute infections are no longer considered a dangerous practice and remain our most effective aid in combating sepsis. I have recently seen a

boy with a severe osteomyelitis, staphylococcus septicemia, lung abscess and pneumothorax recover after having been critically ill for many weeks. He was transfused early while his temperature was very high without any untoward results. It is impossible to prove that the transfusions were directly responsible for the cure, as spontaneous improvement in such cases is occasionally seen. It is also impossible to collect comparable series of treated and nontreated cases of sepsis, as each patient has certain clinical variations that render comparison difficult. Krahulik and Koch report seventeen cases of lateral sinus phlebitis with septicemia treated with blood transfusion with a mortality of 35 per cent. Stetson states that any patient with septicemia without pneumonia or meningitis has an even chance of recovery if transfusion is employed. One is left with the impression that transfusion is justified in the treatment of sepsis, although actual figures proving a reduction in mortality are still forthcoming.

Pneumonia.—It is becoming increasingly more frequent to transfuse infants with pneumonia, and it should no longer be considered the hazardous procedure it was formerly supposed. It is particularly valuable in anemic infants with pneumonia; in the prolonged bronchopneumonia that follows pertussis, and less often in any type of pneumonia in which the outcome is problematical. A sufficient number have been transfused to prove that the presence of cyanosis, high fever, or dyspnea are not contraindications, provided the blood is administered slowly.

Erysipelas.—The use of transfusions in erysipelas seems of distinct value. The only satisfactory proof of the efficacy of this form of therapy is a reduction of the high mortality that occurs in the first year or two of life. Between five and fifty years of age the mortality in untreated cases is only four per cent and, hence, this group does not offer a means of comparison. In infants, however, we have frequently seen improvement immediately following transfusion and feel that it is chiefly the patients with positive blood cultures that do not respond to this or any other form of treatment. It should be remembered that in patients who show no improvement the use of another donor is indicated and often effects a cure. Jacobsen's report is particularly instructive. On two occasions he was unable to check the course of the disease with erysipelas antitoxin, but obtained prompt results with blood transfusion.

Marantic Infants.—The highest mortality at every pediatric hospital comes from the feeble marantic infants with respiratory infections and gastro-intestinal disturbances. These children are notoriously difficult problems and often succumb despite the best of treatment. The use of blood transfusions given early and repeated frequently has been of the greatest help and is carried out extensively at most institutions. Technical difficulties in these small babies have led to the use of

intraperitoneal and intramuscular blood. Powers and others strongly advocate the intravenous route, and feel that the subsequent increased rate of blood flow is an especially desirable factor. It is also true that in the infants with feeble circulation the absorption is slow, and blood remaining in the peritoneal cavity unduly long may cause severe vomiting and signs of local irritation.

Burns.—Some years ago Bruce Robertson, the Canadian surgeon, advocated the use of the exsanguination-transfusion in infants moribund from extensive burns. He felt that the removal of a fairly large quantity of blood immediately preceding the transfusion would rid the patient of a good portion of the toxic products absorbed from the skin. In addition, it permits the administration of a much larger quantity of blood than could otherwise be given. Although this method has never gained wide popularity, I have observed three critically ill patients recover after its use and feel that it deserves a trial whenever the prognosis is doubtful.

Other Diseases.—In hemorrhage and in the various blood dyscrasias, transfusion has always been of the greatest help. It is likewise especially valuable as a postoperative measure in empyema and following operations for mastoid disease and osteomyelitis. It is occasionally necessary as a preoperative measure in pyloric stenosis, or as a means of rapidly improving a child's condition in preparation for any surgical procedure. In those prolonged and trying cases of celiac disease or carbohydrate intolerance, transfusion often supplies the necessary stimulus for a more rapid improvement. It is also helpful in relieving the severe anemia accompanying acute rheumatic fever and also nephritis, and increases the resistance of these patients to upper respiratory infections. Marriott feels that its use in nephrosis is distinctly helpful in relieving edema and causing general improvement, but other observers have not had such fortunate results. Sidbury's report of fourteen cases of severe acute respiratory infections with vomiting and diarrhea, so-called influenza-acidosis, treated with blood transfusion with recovery in all instances is perhaps an example of overenthusiasm. We have all seen patients with similar infections respond just as promptly to intravenous saline and glucose and the usual medicinal regimen.

COMMENT

It is the consensus of opinion that entirely too much attention is devoted to a discussion of the methods of administering blood. So many ingenious machines have been devised and so many modifications adopted that each hospital has a slightly different procedure. Any method which can be skillfully executed is the method of choice. "Mauling a small infant for an hour or more in order to give a few ounces of blood is often more detrimental than beneficial." Blood should be given at the rate of ten cubic centimeters per minute, using a minimum of ten and a maximum

of forty cubic centimeters per kilogram.* Some degree of reaction is often unavoidable. The type of glassware, the preparation of rubber tubing, and the temperature of the blood are factors that have frequently been emphasized. The use of fasting donors, a point recently emphasized by Brem and Zeiler, greatly diminished the number of reactions in their series. The blood of a recipient occasionally does not match that of a former donor. This may be due to the fact that iso-agglutinins are not always established at birth. Patients with Hodgkin's disease notoriously react badly. In matching blood it seems advisable to allow the preparations to stand for at least one hour. Guthrie and Pessel report a case in which the blood of two individuals in the same group manifested strong agglutination at ice-box temperature; none in the incubator, and a wide variation at room temperature—extending from strong agglutination to none whatever, depending on the temperature of the room. They ruled out the possibility of an auto-agglutinin and concluded that a relatively weak agglutinin could manifest clumping in the cold, but escape recognition at room or incubator temperature.

In such an important task as blood matching, it is far better to divide the responsibility and not let it rest on one individual. A system should be inaugurated whereby each procedure is so carefully checked and rechecked that if a mistake is made it is quickly discovered by another person, and ultimately is of little or no consequence. Doan in an article entitled "The Transfusion Problem," says: "Certain it is that the work of these past months has taken the procedure of blood matching entirely without the realm of the casual passing attention of an inexperienced intern and placed it within the province only of the most carefully trained experienced quantitative clinical laboratory worker. The importance of blood matching is measured by nothing less than the life of the patient himself in a therapeutic procedure so frequently employed as a life-saving measure and so easily capable of effecting the opposite result."

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DISCUSSION

P. F. McMURDO, M. D. (909 Hyde Street, San Francisco).—The subject of blood transfusion is of so much importance that the more it is brought to the attention of the profession the better.

Transfusion should be used much more often than it is used, as there need be no fear of attempting it by any physician, provided the laboratory facilities are available for typing and cross matching the blood. This work should be done by an expert, the average intern scarcely being prepared to do it correctly.

The history of the donor is important and a repeated Wassermann, but an examination of the donor immediately before the transfusion is important also.

I believe whole unmodified blood only should be used. With a modern transfusion apparatus it is easy. It should not be necessary to "maul" an infant in giving a transfusion, a needle in the vein being all that is necessary. Of equal importance, one should not

* The most comprehensive recent review of the subject is by Dr. Grover Powers in the Transactions of The American Pediatric Society, 1929, Vol. 41.

macerate or mutilate the blood cells; damaged cells do no good and are a frequent cause of severe protein reactions, and reactions are to be avoided, as no patient in need of a transfusion is in condition to stand them.

Transfusions can be relatively of more use in children than in adults because it is easier to get a sufficient quantity of blood for a child.

In regard to method, I cannot agree with the statement of Doctor Cook that one should learn several methods and use the one best suited in a given case. The modern transfusion apparatus is so revolutionary and so superior to the old-fashioned pump, which churned up the blood in a glass syringe and forced it through pet cocks or ball valves, mixing it with the lubricating oil and mutilating the cells, that one need know but one method.

Especially should defibrinated blood, or citrated blood be condemned. In repeated transfusions, particularly if the same donor be used, a patient may become hypersensitive to transfused blood, showing an anaphylactic shock. This hypersensitiveness may be tested for, and if found, the patient may be desensitized as in serum injections. It is, of course, difficult to positively state in a given patient that a transfusion will be or was life saving, but the results are often so brilliant that it should be done even in cases where there may be a doubt of its efficacy. Frequently a transfusion will do as much or even more for an infant than a month of special open-air treatment. While I do not consider transfusion a panacea, I do believe, when in doubt, the child should be given the benefit of the doubt and get the blood. In the present state of our knowledge we cannot state its limitations.

The blood should never come into contact with glass that is not coated with paraffin. The blood should not be longer than thirty or forty seconds out of the human body.

One should always remember that the blood is composed of myriads of delicate living cells, which if broken become merely a mass of protein.

Of course, no well known remedy should be neglected because one is using blood transfusion. Transfusions should be repeated every eight to ten days, unless contraindicated. As a general rule an infant can be given the necessary amount of blood in five to eight minutes.

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E. P. Cook, M. D. (Sainte Claire Building, San Jose).—We cannot have the subject of blood transfusion brought to our attention too forcibly or too frequently. Its value in the various conditions stated by Doctor Rothman is beyond question even though it may be difficult of exact statistical research. Those who have had experience in its use have a very positive feeling regarding its value. I should like to emphasize the anemias as giving one of the most frequent indications. Anemia is an almost constant finding in our malnourished babies and those presenting a difficult feeding problem. The giving of blood in amounts of 100 to 150 cubic centimeters two or three times, at intervals of ten days, will result in an increase of two million red cells.

I should also like to mention shock as another indication; and by shock I mean not only the traumatic and surgical variety, but also the newer conception of medical shock which accompanies pneumonia, the acute infections, and diabetic coma.

It is my belief that unless one has the understanding coöperation of a surgeon that pediatricians should be prepared to perform their own transfusions. It is a therapeutic procedure, the technique of which we can easily master, and if we will continue alive to its possibilities and be prepared to do it ourselves we are making a distinct advance in our therapeutics.

A recently encountered complication, unusual and interesting, is worthy of mention. An infant of ten months was given an intraperitoneal transfusion of 120 cubic centimeters of citrated blood. On the morn-

ing of the fourth day following, a sausage-shaped tumor mass was noted extending from the right external inguinal ring to the lower portion of the scrotum. Investigation revealed this to be a hematocoele of the transfused blood. It may be difficult to differentiate such a condition from a strangulated hernia, because this one was irreducible, did not transmit light, presented an impulse on coughing, and caused no discoloration of the skin of the scrotum.

Doctor Rothman wisely refrains from advocating any particular method. Let us become familiar with several and choose the one best adapted to the individual case. I like particularly his statement that "mauling a small infant for an hour or more in order to give a few ounces of blood is often more detrimental than beneficial."

FUNCTIONAL DISORDERS VERSUS ORGANIC HEART DISEASE IN CHILDHOOD*

REPORT OF CASE

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DISCUSSION by A. J. Scott, Jr., M. D., Los Angeles; Harold K. Faber, M. D., San Francisco; Edward B. Shaw, M. D., San Francisco.

IN growing children, from infancy through adolescence the occurrence of either subjective symptoms or actual physical signs referable to the heart is relatively common. In the children's heart clinic of the University of California Hospital the author sees a good many children in the course of a year who have no organic heart disease and yet who present some symptom or physical finding which has been interpreted as being dependent upon cardiac disease. Occasionally patients are seen with rheumatic heart disease in whom no organic heart disease has been suspected. This paper will discuss the differentiation between organic disease and functional disorders of the child's heart.

To say that our first duty is that of diagnosis is a type of truism which even medical students resent, but I shall try to show that diagnosis, prognosis and actual treatment are so closely linked together as to make it necessary to be treating, diagnosing and working out a reliable prognosis all at the same time. Unless one considers: first, congenital cardiac defects; second, acquired organic heart disease (which is almost always of rheumatic origin); and third, functional disorders, in every patient with cardiac symptoms, one will surely fail in meeting the first obligation, that of diagnosis.

Patients who have had an acute rheumatic arthritis or chorea associated with an acute carditis with the resultant valve damage, offer little real difficulty in diagnosis. The treatment for such cases has been so thoroughly described in textbooks and journals as to relieve me of the necessity of discussing it here. Similarly patients who present a story of cyanosis since birth with loud heart murmurs offer no great problem ex-

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